

# Pasture Responses to Nutrient Source and Tall Fescue - Endophyte Association in the Southern Piedmont USA



Alan J. Franzluebbers and John A. Stuedemann  
United States Department of Agriculture -  
Agricultural Research Service  
1420 Experiment Station Road,  
Watkinsville GA 30677 USA  
Contact: afranz@uga.edu, 1-706-769-5631



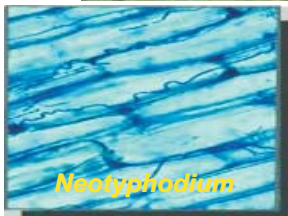
## Hypotheses

- ✓ Nutrients derived from inorganic or organic sources would affect forage and cattle productivity by:
  - altering seasonal and total availability of macro and micronutrients
  - interacting with endophyte-induced metabolites of forage
- ✓ Novel endophyte would improve cattle performance and productivity compared with wild-type endophyte
- ✓ Novel endophyte would improve tall fescue persistence compared with endophyte-free grass

## Spreading inorganic fertilizer



## Spreading poultry litter

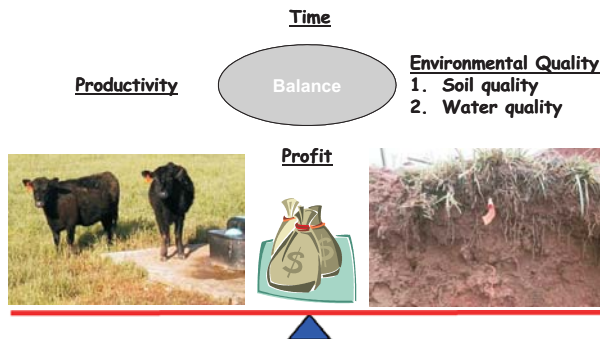


## Objective

- ✓ Determine the effects of fertilization source and tall fescue-endophyte association on:
  - Botanical composition
  - Tall fescue persistence
  - Cattle stocking rate
  - Cattle performance
  - Cattle production



## ----- The Issues -----



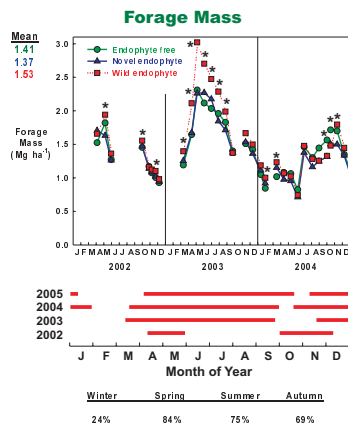
## Experimental Design

- ✓ 14, 1-ha paddocks of 'Jesup' tall fescue
  - All with water flume to collect water runoff
- ✓ Total of 7 treatments, each replicated twice
  - Six treatments grazed by yearling heifers

Fertilization Source X Tall fescue-endophyte association

- ✓ Inorganic
- ✓ Broiler litter
- ✓ Endophyte-free
- ✓ Novel endophyte
- ✓ Wild-type endophyte

- One treatment cut for hay
  - inorganic fertilizer, novel endophyte



Percent ground cover in July 2004 during 3<sup>rd</sup> year of grazing

Component	Free	Novel	Wild
Tall fescue	70	79	79
Annual grass	13	0	1
Broadleaves	1	3	0
Bare ground	17	18	16

Mean weight of all heifers stocked on pasture (Mg/ha)

Period	Free	Novel	Wild
Winter	0.72	0.69	0.82
Spring	1.03	1.04	1.32
Summer	1.12	1.08	1.33
Autumn	0.77	0.76	0.89
Yearly	0.96	0.94	1.16

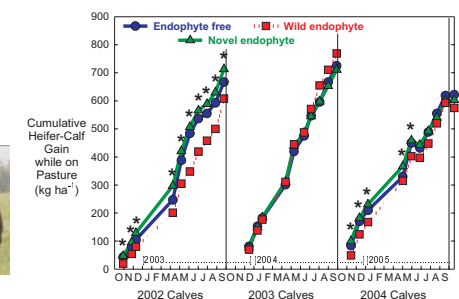
## Cattle Performance and Production

Average daily gain of heifers on pasture (kg/head/day)

Period	Free	Novel	Wild
Winter	0.69	0.84	0.62
Spring	0.98	0.98	0.63
Summer	0.63	0.60	0.55
Autumn	0.63	0.72	0.43
Yearly	0.75	0.78	0.55

Live-weight gain of heifers on pasture (kg/ha)

Period	Free	Novel	Wild
Winter	49	56	51
Spring	281	284	241
Summer	133	125	112
Autumn	141	155	112
Yearly	604	620	562



## Conclusions

Fertilization source had no impact on how forage and cattle responded to tall fescue-endophyte association.

Typical wild endophyte effect on cattle performance was observed, but not necessarily in the heat of summer when a large effect was expected.

Novel endophyte association produced excellent cattle gain and was able to persist during at least three years of grazing.

Pastures were stocked with more cattle with wild endophyte to achieve a common forage mass level among treatments, resulting in similar total cattle live-weight gain.

Opportunities to manage wild endophyte are possible (e.g., manipulating fertilizer quantity and timing and season of grazing), so that negative effects of ergot alkaloids can be avoided.